<u>IN THE CLAIMS</u>

Please amend the following of the claims which are pending in the present application:

1.   (Original)   A method for identifying pathology in a brain image comprising the steps of:

(a)   determining the location of the midsagittal plane (MSP) by calculating up to 16 approximated fissure line segments (AFLSs) and removing outlier AFLSs, the outlier AFLSs having a larger angular deviation from the MSP than a predefined threshold;

(b)   calculating the ratio of the number of outlier AFLSs to the number of inlier AFLSs, the inlier AFLSs having a smaller angular deviation from the MSP than the predefined threshold; and

(c)   comparing the ratio with a further predetermined threshold value, the ratio exceeding the further predetermined threshold value when pathology is present in the brain image.

2.   (Original)   A method as claimed in claim 1, wherein the image comprises image data and the method further comprises the step of:

reformatting the image data to align the image with the midsagittal plane.

3.   (Original)   A method as claimed in claim 2, wherein the reformatting is performed using vector manipulation.

4.   (Currently amended)   A method as claimed in claim 2 [[or 3]], wherein the midsagittal plane has an equation $x'+d'=0$ where x' is a co-ordinate in the O'X' direction and d' is a constant, the image having an original co-ordinate system OXYZ before reformatting and a reformatted co-ordinate system after reformatting comprising co-ordinates O'X', O'Y' and O'Z', the step of reformatting comprising:

(i)   starting with an MSP equation:

$$ax + by + cz + d = 0,$$

where d is less than 0 and (a,b,c) is the unit normal vector of the MSP;

(ii)   determining two points that are the intersections between the MSP and the volume of the brain shown in the image under examination, denoting the two points as A $(x_A, y_A, 0)$ and $(x_B, y_B, 0)$, both of the two points being on the MSP;

(iii)   when a is not equal to 0, calculating A and B as follows:

$$x_A = -d/a, \quad y_A = 0$$

$$x_B = -(d+b(ySize - 1))/a, \quad y_B = ySize - 1$$

where ySize is the number of voxels in the Y direction of the original volume;

(iv)   when a is 0, b should not be 0, and calculating A and B as follows:

$$x_A = 0, \quad y_A = -d/b$$

$$x_B = x\,Size - 1, \quad y_B = -(d + a(xSize - 1))/b$$

where xSize is the number of voxels in the X direction of the original volume; and

(v)   changing the original coordinate system OXYZ to the reformatted co-ordinate system O' X' Y'Z', the unit vectors of the co-ordinates O'X', O'Y' and O'Z' being calculated in the following manner:

$$O' X' = (a, b, c) = (n_{x1}, n_{y1}, n_{z1})$$

$$O'Y' = ((xA\text{-}xB)/ |A\text{-}B|, (yA - yB)/ |A\text{-}B|, 0) = (n_{x2}, n_{y2}, n_{z2})$$

$$O'Z' = O'X' x O'Y' = (n_{x3}, n_{y3}, n_{z3})$$

where |A-B| is the Euclidean distance between points A and B, the transformation between OXYZ and O'X'Y'Z' being defined as follows:

$$X' = n_{x1} X + n_{y1} Y + n_{z1} Z$$

$$Y' = n_{x2} X + n_{y2} Y + n_{z2} Z$$

$$Z' = n_{x3} X + n_{y3} Y + n_{z3} Z$$

$$O' = 0.$$

5.   (Currently amended)   A method according to ~~any one of the preceding claims~~ claim 1 further comprising the step of:

processing one or more slices through the image to determine interhemispheric symmetry.

6. (Original) A method according to claim 5, wherein the step of processing comprises processing one or more slices having a plane substantially perpendicular to the midsagittal plane.

7. (Currently amended) A method according to claim 5 [[or 6]] wherein the step of processing comprises processing one more slices having a plane which intersects the midsagittal plane.

8. (Currently amended) A method according to ~~any one of claims 5 to 7~~ claim 5 wherein the image comprises data representing the brain and background image data, the step of processing comprising extracting the background image data and retaining the data representing the brain.

9. (Original) A method according to claim 8, wherein the image is comprised of a number of pixels, the step of extracting comprising calculating a histogram of grey level of the image along a first axis against the number of pixels of the image along a second axis, locating a first peak in the histogram formed at the intersection of a positive slope and a negative slope, extrapolating the approximating the positive slope back to intersect the first axis and taking the value of grey level at the intersection of the positive slope with the first axis as a threshold grey level value.

10. (Original)   A method according to claim 9, wherein the step of processing comprises further processing the image to obtain a binary image by setting the pixels having a grey level greater than the threshold grey level to 1 and the pixels having a grey level lower than the threshold grey value to 0.

11. (Original)   A method according to claim 10, wherein the image depicts the brain and a skull, the method further comprising the steps of opening the binary image with a structuring element of pixels and expanding the structuring element to fill the image of the skull to produce a head mask.

12. (Original)   A method according to claim 11, further comprising cropping the image to the head mask to remove the background data visible in the image.

13. (Original)   A method according to claim 12, further comprising calculating a histogram of grey level of the image along a first axis against the number of pixels of the image along a second axis for each hemisphere, smoothing the histogram for each hemisphere, comparing the histograms of the two hemispheres by calculating the difference between the histograms.

14. (Original)   A method according to claim 13, wherein the step of calculating the difference in values between the histograms comprises calculating a difference function between the values of the histograms for all grey levels.

15. (Original) A method according to claim 13, wherein the difference function has a maximum value and a minimum value, the method further comprising identifying when the difference between the maximum value and the minimum value exceeds a threshold difference value to indicate pathology presence in the brain under examination.

16. (Currently amended) A method according to ~~any one of claims 13 to 15~~ claim 13, wherein the step of comparing the histograms comprises calculating the difference in area of the histograms, or the normalized difference in area of the histograms.

17. (Currently amended) A method according to ~~any one of claims 13 to 16~~ claim 13, further comprising the step of aligning the histograms along an axis before comparing the histograms.

18. (Original) A method according to claim 17, wherein the step of aligning the histograms comprises maximising the cross-correlation of the histograms.

19. (Currently amended) A method according to ~~any one of claims 6 to 18~~ claim 6, further comprising determining extent of pathology in the brain under examination.

20. (Original) A method according to claim 19 wherein the step of determining extent of pathology comprises determining the ratio of the number of slices with pathology to the total number of slices studied.

21. (Currently amended) A method according to claim 19 [[or 20]], further comprising determining the location of the pathology.

22. (Original) A method according to claim 21, wherein the step of determining the location of the pathology comprises locating the hemisphere that contains pathology.

23. (Original) A method according to claim 22, wherein the step of locating comprises determining the modality of histograms for both hemispheres of the brain under consideration, tri-modality existing for both hemispheres being an indication of a small pathology existing in one or both hemispheres.

24. (Original) A method according to claim 23, comprising determining if one or both of the hemispheres is not tri-modal indicating pathology existence therein and, if one or both of the hemispheres is not tri-modal determining the modality of the histograms for each slice.

25. (Original)   A method according to claim 24, further determining if tri-modality exists for all of the slices within both hemispheres, and if it does not exist determining if the ratio of the number of outlier AFLSs to the number of inlier AFLSs.

26. (Original)   A method according to claim 24, further determining if tri-modality exists for all of the slices within both hemispheres, and if it does not exist determining if the ratio of the number of outlier AFLSs to the number of inlier AFLSs.

27. (Currently amended)   A method according to ~~any one of the preceding claims~~ <u>claim 1</u>, further comprising the step of calculating one or more additional features of each hemisphere, comparing the one or more additional features, and if their difference is larger than a predetermined threshold, signalling the existence of pathology.

28. (Original)   A method according to claim 27, wherein the step of calculating one or more features comprises calculating one or more of intensity mean, moments, cross-correlation, and mutual information.

29. (Currently amended)   An apparatus arranged to perform a method for identifying pathology in a brain image according to ~~any one of the preceding claims~~ claim 1.

30. (Currently amended)   A computer program product comprising computer program instructions readable by a computer apparatus to cause the computer apparatus to perform a method according to ~~any one of claims 1 to 28~~ claim 1.